

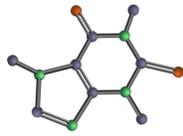
Water quality monitoring using citizen science on beaver river reaches in Switzerland

Project goal



Swiss streams, especially smaller ones, suffer from **poor water quality**.

Beavers have an impact on **water retention**, residence time and contribute to **wetland formation**.

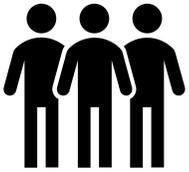


Wetlands can **reduce nitrate** and **increase DOC** (dissolved organic carbon) concentrations in aquatic systems.

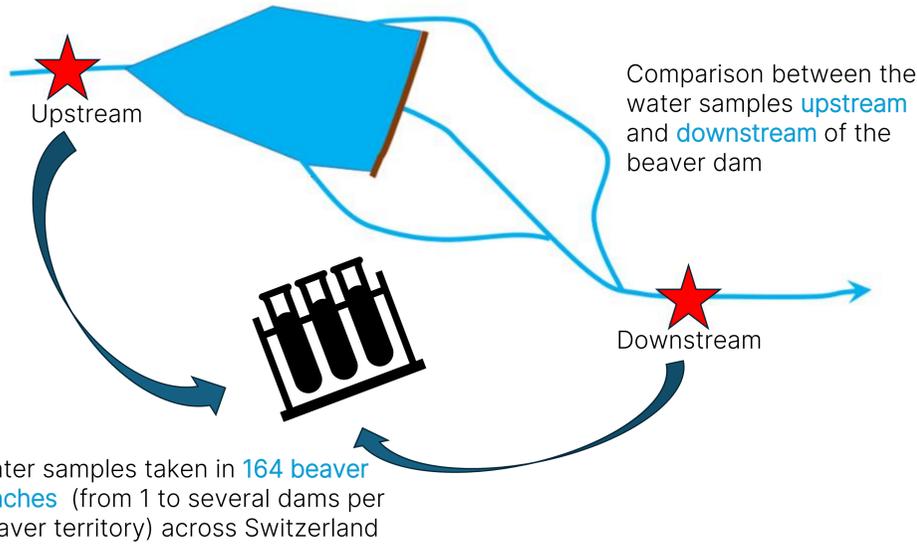
- 1) Assess the spatial and seasonal variability of **beaver system impacts** on **nitrate** and **DOC** concentrations.
- 2) Determine whether there are clear **physical characteristics of beaver systems** influencing the extent of changes in these nutrients.



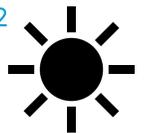
Methods



400 volunteers on the field for the national beaver census in **winter 2021/22**



2 civil service workers and **2 MSc students** in the field to replicate the operation in **summer 2022**



DOC (dissolved organic carbon) and **nitrate** analysis in the lab at the eawag aquatic research

Results

-
Nitrates

A **decrease** in **nitrate** concentrations is **more often** observed during the **summer** season, where out of 158 nitrate measurements, 104 showed a decrease. In winter, 89 out of 158 measurements indicated a decrease.

+
DOC

A **DOC increase** was observed **in summer** in most beaver reaches. **In winter**, beaver dam reaches have a **negligible effect** on DOC concentrations.

There is a **positive correlation** between **wetland size** and **DOC increase / nitrate decrease**.



Originally a closed deciduous mixed forest: beavers flooded 4 ha of woodland in 2009. Site designated as an 11 ha forest reserve, secured for 50 years

CONNECTED beaver wetlands are a **KEY** for **WATER QUALITY** improvement.

Take home messages



BEAVER MATTERS

Beaver modifications of existing wetlands increase the ability of wetlands to **remove nitrate** from surface waters and **increase DOC** loads downstream.



TIME MATTERS

The **lower slope and discharge** of beaver wetlands, along with the **extended water residence time**, suggest reduced water turbulence, which **increases the potential for anaerobic conditions** and therefore a **reduction of nitrate**.



PRODUCTIVITY MATTERS

Wetlands are identified as source of DOC due to **enhanced aquatic net ecosystem production** in the lentic environments.



SIZE MATTERS

The **size and connectivity** of the **wetlands** with the river matter for the amount of **nitrate removal** and **increase in DOC** loads. This trend is more pronounced in summer.



OXYGEN MATTERS

The close coupling of **aerobic and anaerobic conditions** in wetland soils combined with a **high rate of plant productivity** and organic metabolic activity creates conditions favorable for the conversion of nitrate to atmospheric gases by **denitrification**.



PLANTS MATTER

Higher DOC concentrations can be generally attributed to **increased primary productivity in the beaver pond** which is **most pronounced** during the **summer** months.



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More information about the project and reports on this QR-Code